



## Ozone: It's Good, It's Bad, and It's Ugly

When President Clinton announced the decision to adopt new federal standards for ozone and particulate matter air pollution earlier this summer, many people may have wondered what all the fuss was about. After all, most particulate

matter is just dust – right? And we all want to protect the ozone layer, so ozone is a good thing – right?

The May 1997 issue of *"Air Lines"* described the special problems Washington

experiences with particulate matter. It also discussed the possible effects on Washington residents of the then-proposed new standard for this pollutant. The problems associated with ozone are very different from those for particulate matter.



Ozone is the main ingredient of smog; on a smoggy day in Spokane, you can barely see the outline of the hills in the background.

Ozone occurs naturally in the upper atmosphere, where it protects us from the sun's ultraviolet radiation. But at ground level, ozone is a harmful pollutant and the main ingredient of smog. Ozone is a summertime problem in many areas of the United States because it forms when other air pollutants react with sunlight on hot days. It is harmful to human health, trees and other plants, and agricultural crops. The pollutants that form ozone also produce aerosols, which contribute to hazy skies and reduced visibility in both rural and urban areas. Ozone can impair our ability to breathe and cause permanent lung damage, shortness of breath, chest pain, coughing, and eye and throat irritation. People most at risk from ozone are children, people with existing lung disease or respiratory problems, and anyone who spends time outdoors in the summertime – especially if they are exercising or working hard.

The pollutants that form ozone (mainly volatile organic compounds and nitrogen oxides) come from motor vehicles, industrial plants, chemical solvents, and combustion sources such as open burning. From this list of sources, you may get the idea that ozone is mainly a problem in cities and urban areas. This is sometimes true – but you may be surprised at some of the areas in Washington that are troubled by ozone or smog.

Ozone occurs at different concentrations from north of

Vancouver, British Columbia to south of Salem, Oregon. Although the processes that form ozone are the same everywhere, levels of ozone pollution vary depending on local conditions, such as weather patterns and traffic volume. First, the “ingredients” of ozone – volatile organic compounds, nitrogen oxides, and other pollutants – are released into the air by motor vehicles and other sources. These ingredients then “cook” for several hours in the sunlight to form ozone. While this is happening, summer breezes can blow the ozone ingredients quite a distance from the source of the pollution. Some of the highest dosages of ozone in our region have been measured in the Columbia River Gorge and near Mount Rainier, far downwind from the pollution sources. These high ozone levels can damage native plants and vegetation in these scenic areas. In the Puget Sound area, the ingredients of ozone are usually blown from urban areas to the Cascade foothills, where the highest levels have been measured. In southwest Washington, ozone patterns are less predictable.

## Why did EPA change the ozone standard?

More than 3,000 studies have been done on ozone over the past 10 years. Many of these studies show that even levels of ozone below the federal health standard can be harmful to human health. The Environmental Protection

Agency (EPA) revised the ozone standard to provide better health protection.

Here's how the standard works: Concentrations of ozone in the air vary over time. To account for this, the standard is based on an average of ozone levels over a certain length of time. The level of ozone is expressed in “parts per million,” which means the number of ozone molecules we would find if we looked at a million molecules of air. Under the old standard, ozone levels could be no higher than 0.12 parts per million averaged over a one-hour time period. Under the new standard, ozone levels must be no higher than 0.08 parts per million averaged over an eight-hour time period. However, the new standard does allow this number to be exceeded up to three times each year. The shift to an eight-hour block of time instead of a one-hour block was based on medical evidence in numerous studies showing that long exposure is more harmful than very short high level exposure. The new standard should help protect people who spend up to eight hours a day working or playing outdoors.

## Does Washington meet the new ozone standard?

All areas of Washington meet the new ozone standard; however, the central Puget Sound and Portland-Vancouver areas meet it by only a small margin. Population growth and increased motor vehicle use will



# Lifestyles

- ❖ Those of us who enjoy summertime gardening don't usually associate it with air pollution. But emissions from lawn mowers, chain saws, leaf vacuums, and other outdoor power equipment are a significant air pollution source. Today's small engines emit many of the pollutants that combine in hot weather to form ground level ozone. The Environmental Protection Agency expects regulations that are now being developed to bring cleaner lawn and garden equipment to market within a few years. Until then, since one of ozone's effects is to inhibit plant growth, you could be defeating your own purposes! Here are some tips to keep that from happening:
- ❖ Use manual or electric tools. Hand tools are available for many lawn and garden jobs, including lightweight, quiet push mowers. Manual tools offer a great way to get a little extra exercise and don't pollute at all. Electric tools, even when you count the pollution from the power plant that makes the electricity, are much cleaner than gas-powered tools.
- ❖ If you continue to use gas-powered tools, avoid spilling gasoline. Even small gasoline spills evaporate and pollute the air. Use a gas container you can handle easily. Pour slowly and use a funnel or spout with an automatic stop device to keep from overfilling the gas tank. Keep the cap or spout and the vent hole on gasoline containers closed. Transport and store gasoline and power equipment out of direct sunlight in a cool, dry place.
- ❖ Maintain your equipment. Follow the manufacturer's guidelines for maintenance. Change oil and clean or replace filters regularly. Use the proper fuel/oil mixture. Get periodic tune-ups and maintain sharp mower blades. Take time to winterize equipment each fall.
- ❖ Reduce mowing time. Use low-maintenance turf grasses or grass/flower seed mixtures that grow slowly and require less mowing. Check with your local agricultural extension service or lawn and garden center about what works in your region. Also, consider decreasing your lawn area and replacing it with native trees and shrubs that require little or no maintenance. These plants can also reduce your energy costs for heating and cooling your house by providing shade and shelter.
- ❖ Instead of selling or giving away your old gasoline-powered lawn and garden tools, take them to a recycling center so that their materials can be used again in other products.

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continue to make meeting the standard a challenge in these areas. Ecology continues to study ozone to better understand how it forms, how it circulates in the air, and how weather patterns and topography affect it. (See the following article, "Understanding Ozone.") These studies will help air quality agencies determine the most appropriate and cost-effective control strategies.

## Understanding Ozone

To prevent and control ozone pollution, scientists and air quality planners need a better understanding of how the pollutants that form ozone interact. A coalition of federal, state, and local agencies, and university researchers is conducting a series of studies on the causes of ozone, how it forms, and how it circulates through the air in western Washington.

Although the state of Washington has measured ozone since the 1970s, the pollutants that combine to form ozone – nitrogen oxides and volatile organic compounds – have not been regularly measured. Using the information gathered in ozone studies, Ecology has selected appropriate locations to place continuous air monitors for nitrogen oxides. Researchers are conducting special sampling studies on volatile organic compounds throughout western Washington. The pollutants are

examined to determine their sources, where they originated, and how much they are contributing to ozone pollution.

The ozone studies will continue through the summer of 1998. Information received will be used to evaluate the ability of existing air monitors to adequately measure volatile organic compounds, nitrogen oxides, and ozone; to evaluate the effectiveness of existing strategies for controlling ozone; to describe the impacts of ozone "ingredients" on visibility in the region; and to identify how ozone is transported from one geographic area to another. In addition to helping air quality agencies improve their strategies to control ozone, this information will be used in long range planning to address the issues of visibility, regional haze, and fine particulate matter pollution.

# Update

## ***Air pollution monitoring***

***data:*** The Washington State Department of Ecology has the most complete set of air monitoring data in the nation for 1996, according to the Environmental Protection Agency (EPA). Ecology's Air Quality Program and the Manchester lab serviced 89 monitoring stations last year, tracking 100 parameters including various pollutants, weather conditions, and visibility information. Ecology has a completeness rate of 92 percent for the 1996 data.

*Air Lines* is published quarterly and offers updated information on the Clean Air Washington Act and other Air Quality Program activities. *Air Lines* welcomes your comments. Questions and contributions should be directed to:

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